Drought Briefing and web information

- To review hydroclimate conditions for the past month
- To present seasonal forecasts of drought indices.
- Information is used by Drought Monitor authors, Drought Outlook forecasters, NWS RFCs, NWS offices and users
- Products producers and users can exchange information during discussion

This CTB project (A win-win situation)

- improves our products
- encourages collaboration between us (operational center) and research groups.

Enhancing Operational Drought Monitoring and Prediction Products through Synthesis of NLDAS and CPPA Research

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Michigan State University: Lifeng Luo

EMC: Michael Ek, Youlong Xia

CPC: Kingtse Mo, LiChuan chen

Drought Monitoring

- We Monitor drought using drought indices
- Meteorological drought: Precipitation deficit. (SPI index)
- Hydrological drought: Streamflow or runoff deficit (SRI index)
- Agricultural drought: Total soil water storage deficit or soil moisture (Total soil moisture percentile)
- Both SM and Runoff are taken from the NLDAS

Accomplishments

Drought Monitoring:

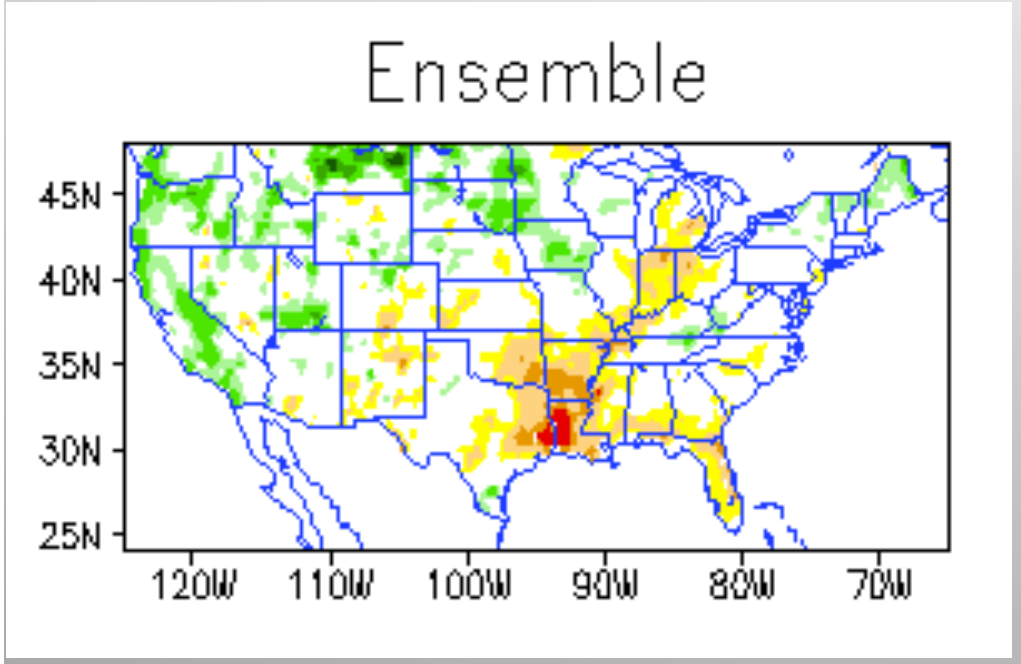
Both UW and EMC/Princeton run near real time NLDAS systems used for drought briefing

- Quantify uncertainties of the NLDAS systems (UW, CPC)
- Develop forcing to drive the NLDAS model from 1915-present at 1/8 degrees over CONUS using index station based method (UW)

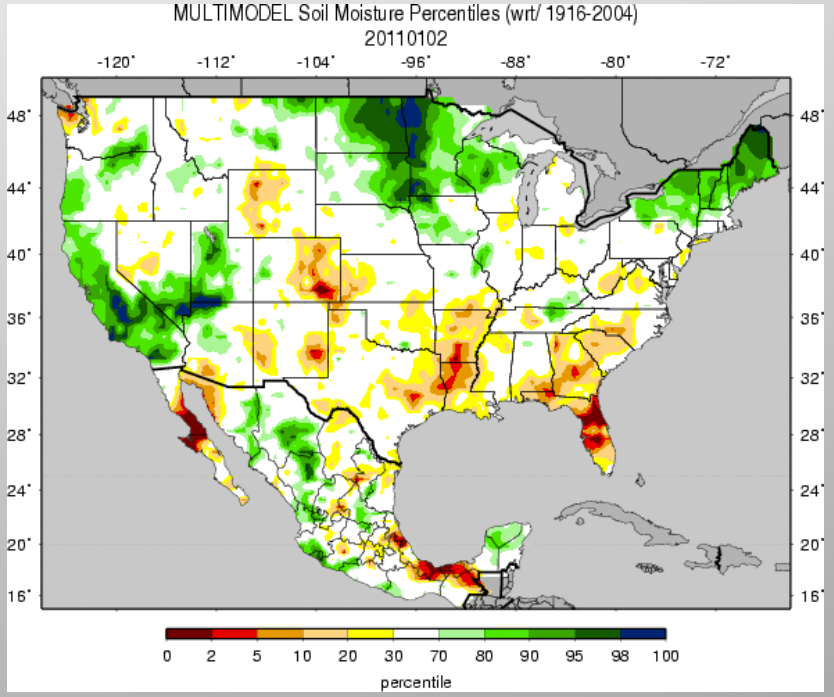
Consistent Difference in SM % appear in real time monitoring

Example: Multi model ensemble SM % for 201101

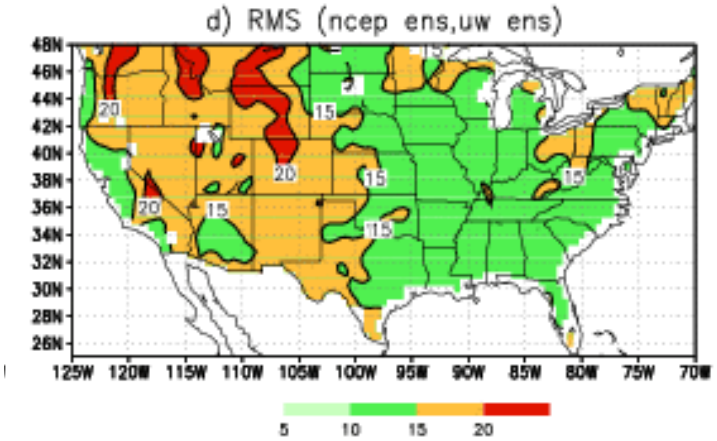
EMC/PU

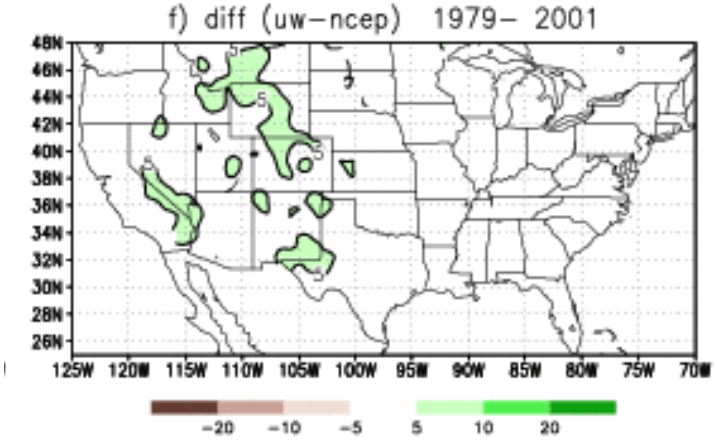


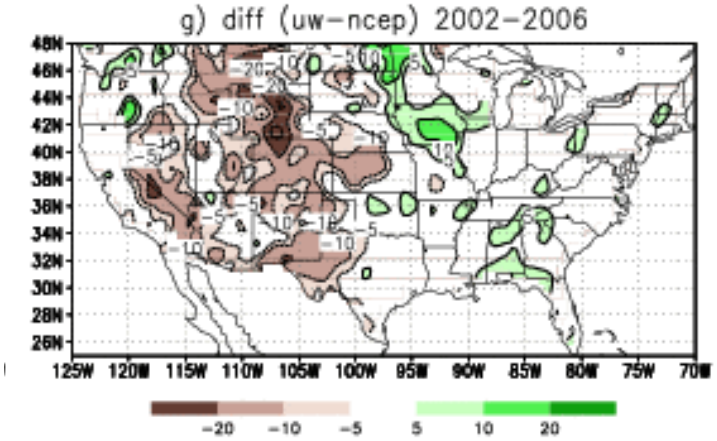
U Washington



1. The patterns are similar, but there are differences:
2. The UW has higher percentiles in Dakotas and Minnesota,
3. Over the Southeast, UW percentiles are also higher







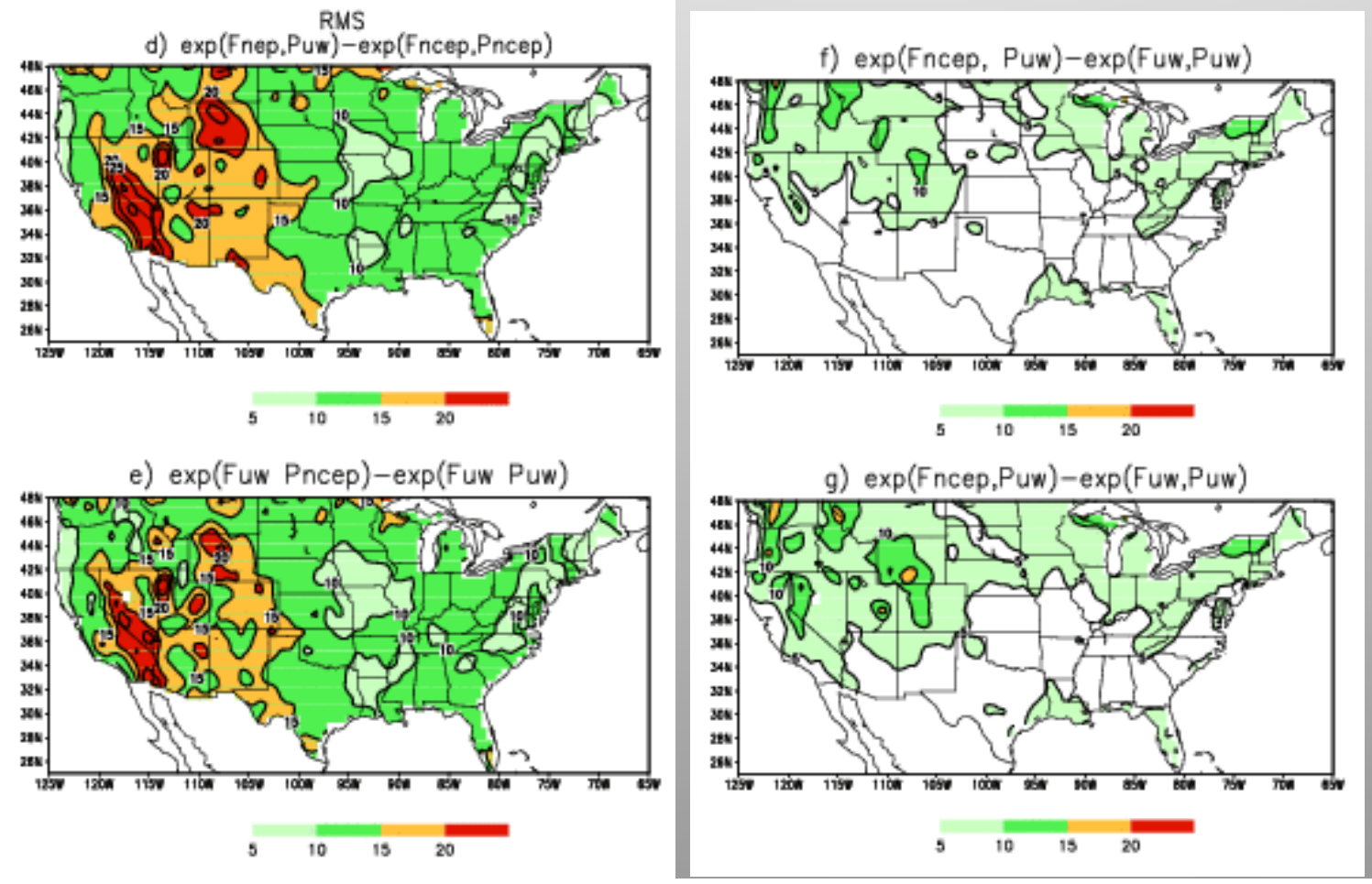
1. The RMS difference (Fig.d) between the ncep and the UW ensemble SM indicates percentiles are large over the western U. S. (> 20%), which is too large for drought classification.

2. Largest differences occur after 2001 as indicated by the mean differences between two systems for two periods (Fig. f and g)

VIC Experiments
RMS differences of SM %

Same F forcing: Tmax, Tmin and wind speed

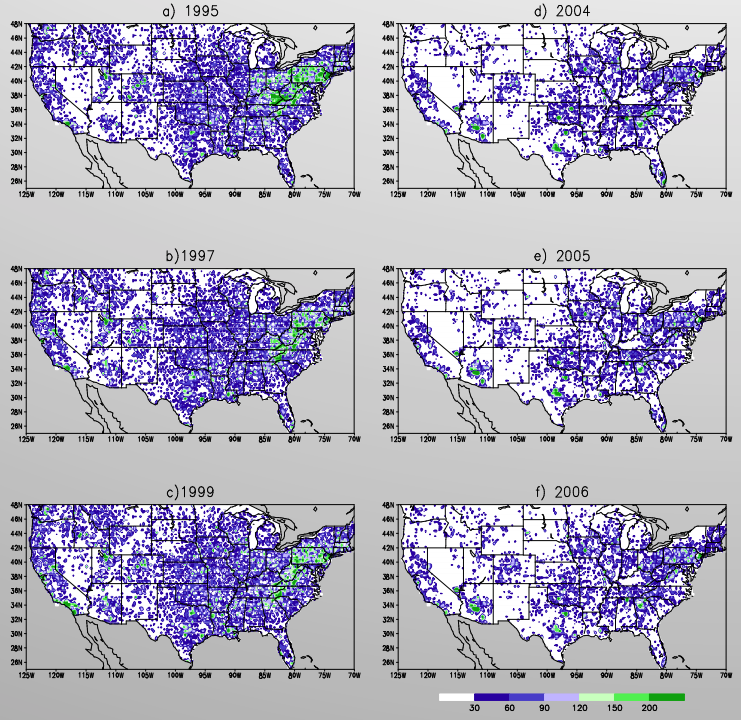
Same P forcing



Number of station reports for 0.5 grid box /month averaged over a year

Historical period

Real time period



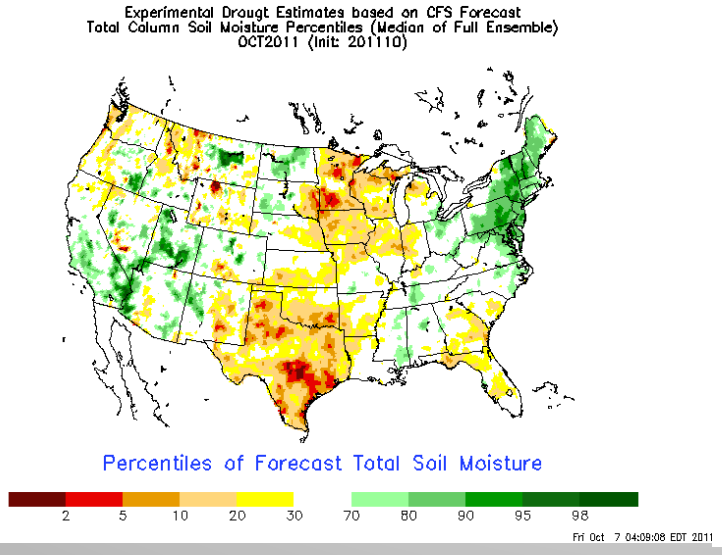
Conclusions

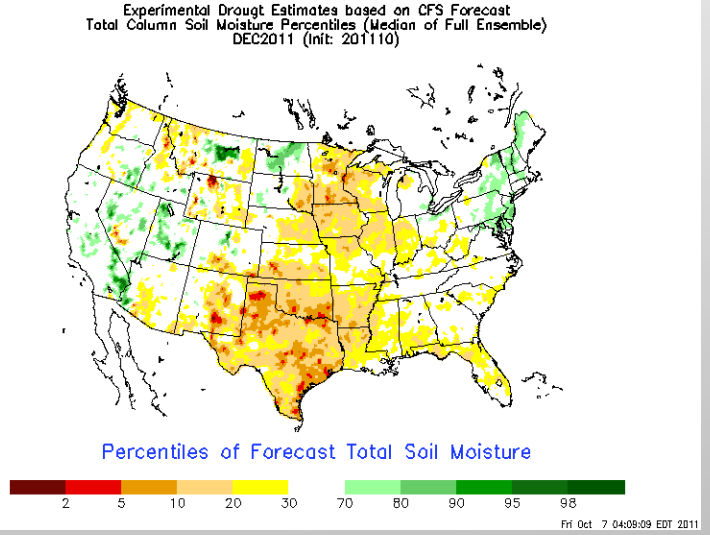
- Consistent differences of the ensemble mean SM and runoff are observed between the NCEP and the UW NLDAS.
- Major differences are located over the western United States where data coverage is sparse.
- Large differences are after 2001 when both systems went real time.
- The differences are caused by the differences in precipitation forcing

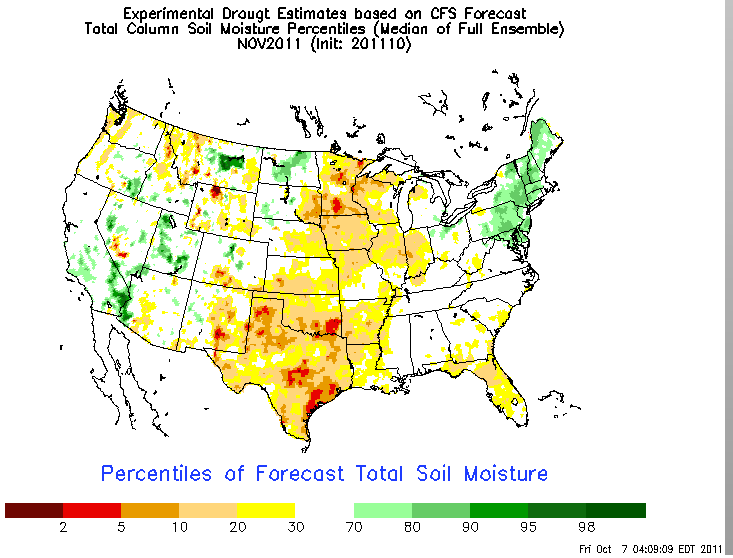
Drought Forecasts Accomplishments

- Transition of the objective drought monitoring and prediction system to NCEP EMC and provide information to Drought forecasters (PU,EMC)
- Evaluate CFsv2 and upgrade the forecast system to use CFSv2 (PU)
- Integration of all three drought prediction systems (i.e. PU, UW, EMC)

SM percentiles fcsts for Oct-Dec 2011 (EMC/PU)



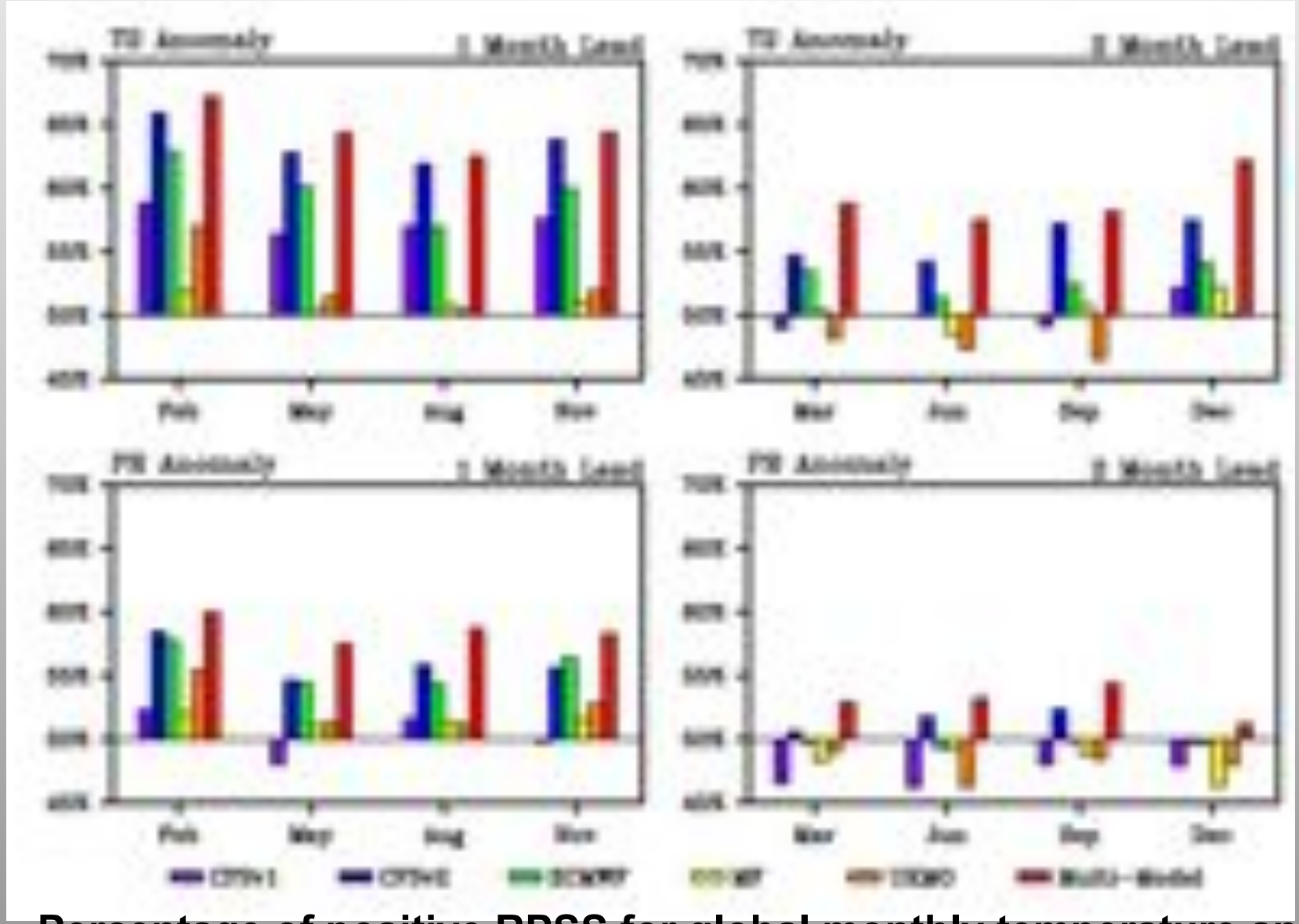




Fcsts indicate:

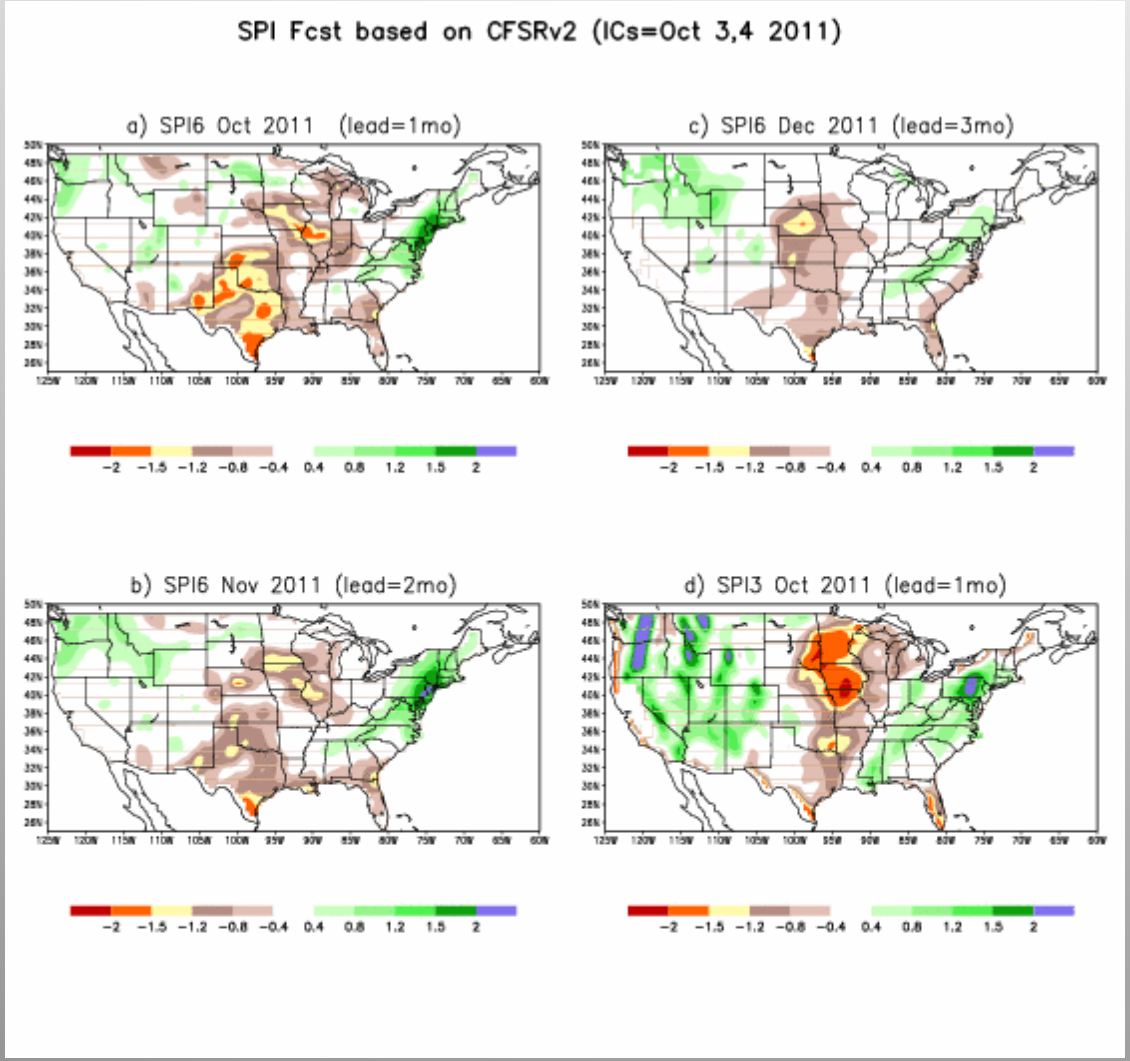
- Drought over the southern Plains will continue and extends northward;
- Drought over the Southeast improves

Upgrade the drought prediction system with CFSv2



Percentage of positive RPSS for global monthly temperature and precipitation anomaly

SPI forecasts (CPC/PU)
(In operation in April 2011)



Together with fcsts from the EMC/PU and the UW . We are able to give forecasters the future drought development

Assessment and verification

- Importance of initial conditions to seasonal forecasts (Shukla and Lettenmaier 2011)
- Importance of snow/SM conditions to fcsts
- How to use daily forecasts to improve seasonal drought forecasts (CPC/UW)?
- Comparison of skill between CFSv1, CFSv2 and ESP for river discharge (eastern US, being extended to CONUS)
- Assessment of skill in predicting on-set , continuation and recovery of drought over the SE NIDIS Testbed (PU)

Soil Moisture, Snow, and Seasonal Streamflow Forecasts in the United States (*Mahanama et al., 2011*)

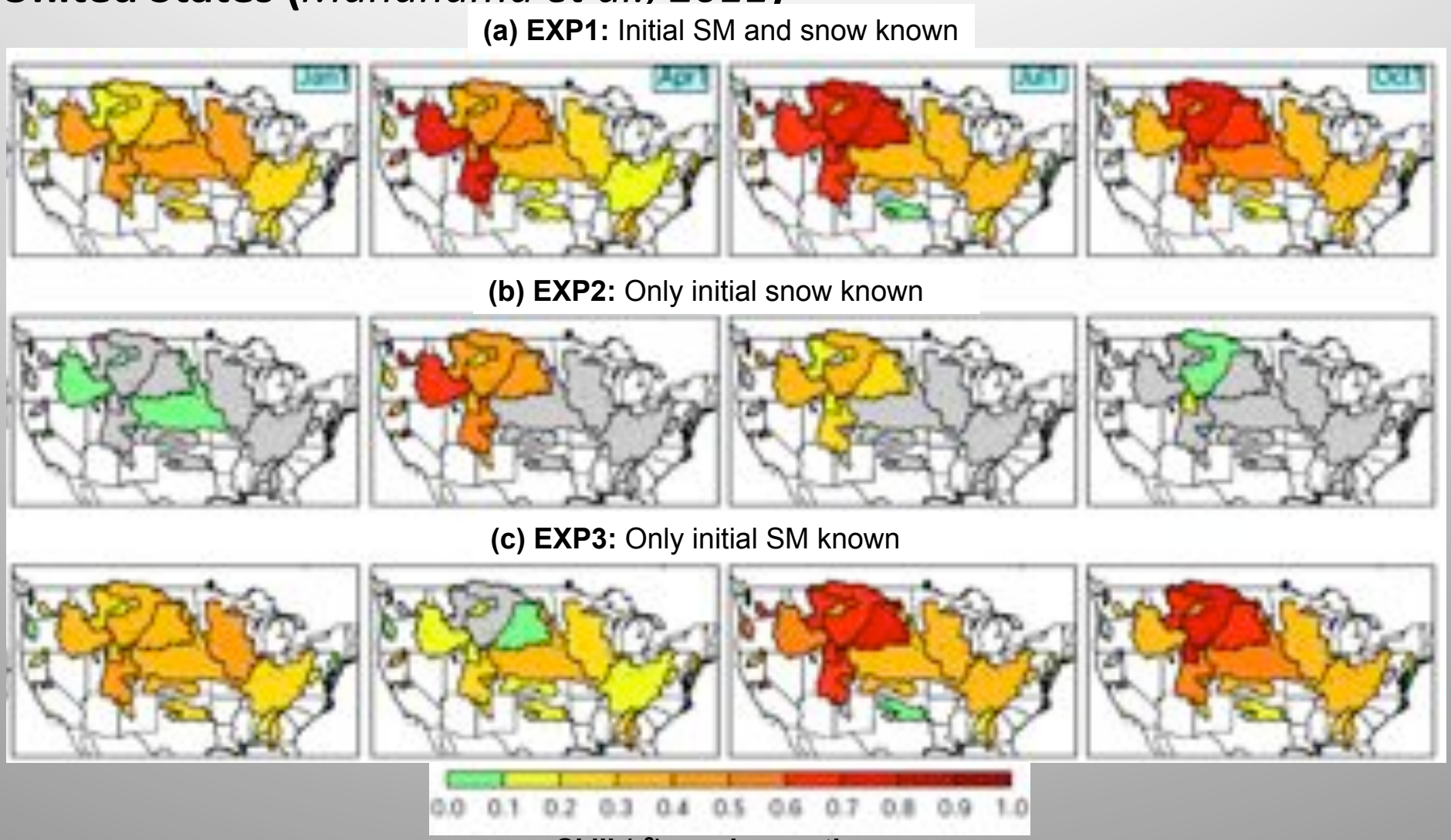


Fig. 4: Skill (r^2) of multi-model ensemble 3-month streamflow forecasts at 0-month lead for four start dates (columns) and the three experiments (rows). Gray shading indicates that skill levels are not significant at the 95% level.

Conclusions

- This project demonstrates the success of the CTB.
- The EMC and CPC have been working together with the Princeton university and the University of Washington to improve drought monitoring and prediction. That provides drought forecasters, NWS RFCs, field offices and users the best assessment on current and future drought conditions.